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## NATIONAL EXAMS MAY 2009

### 04-Env-B1, Environmental Assessment and Management Systems

**3 hours duration**

#### NOTES

1. If doubt exists as to the interpretation of any question, the candidate is urged to submit with the answer paper, a clear statement of any assumptions made.
2. This is a Closed Book Exam with a candidate prepared 8.5 x 11 double sided Aid-Sheet allowed.
3. Candidates may use one of two calculators, the Casio or Sharp approved models. Write the name and model designation of the calculator on the first inside left hand sheet of the exam work book.
4. Any five (5) questions constitute a complete paper. Only the first five (5) answers as they appear in your work book(s), will be marked.
5. Each question is worth a total of 20 marks with the section marks indicated in round brackets ( ) at the left margin of the question. The complete Marking Scheme is also provided on the final page. A completed exam consists of five (5) answered questions with a possible maximum score of 100 marks.

### Problem 1

Provide answers to the following questions related to *analysis of environmental impacts using technical and non-technical parameters* and *applicable federal, provincial or territorial environmental legislation*:

- (7) (i) Identify and briefly discuss two pre-impact phases and one post-impact phase of an environmental impact assessment that can identify key stress areas for appropriate environmental action.
- (7) (ii) Describe two *impact indicators* from an environmental impact analysis and show how they may be used to determine the impacts on the hydrosphere due to discharge of cooling water from a newly commissioned nuclear plant used to generate electricity.
- (6) (iii) Describe the process of regulating and enforcing environmental legislation to minimize environmental impacts. In your description select a specific federal or provincial/territorial legislation as applied to a real situation.

### Problem 2

Provide answers to the following questions related to: *environmental impact assessment applied to solid waste management, urban development, effluent control and air pollution control*:

- (5) (i) List and describe three (3) major steps involved in conducting an environmental impact assessment related to the decommissioning of a nuclear generating plant and the establishment of a radioactive solids waste management site.
- (4) (ii) List and describe two (2) approaches or models (mathematical or conceptual) that you would use to make impact predictions related to urban intensification.
- (5) (iii) As the city environmental engineer, briefly explain how you would use the principles of environmental impact assessment to convince the municipal council that it is necessary to spend resources to upgrade stormwater management facilities to reduce the quantity and improve the quality of the stormwater discharges.
- (iv) Describe the importance of the following terms as it relates to air pollution controls:
  - (3) (a) Air emissions industrial audits
  - (3) (b) Ambient air quality standards

### Problem 3

Answer the following questions related to *environmental audits* and *geographical information systems (GIS)*:

- (5) (i) Briefly describe two (2) key objectives of an environmental audit and explain how the potential benefits can offset the costs.
- (7) (ii) Briefly describe three (3) key elements of a geographical information system (GIS) and explain why accurate metadata structures are essential in GIS systems.
- (8) (iii) Briefly explain the elements of the environmental management systems (EMS), describing how each different element and its integration with the other elements is critical to the success of an EMS. Use an example to facilitate your explanation.

### Problem 4

Provide answers to the following questions related to *principles of sustainable development* and *protection of natural resources for sustainable development*:

- (8) (i) Briefly describe how the general principles of sustainable development may assist in minimizing the total carbon emissions (TCE) associated with resource development (e.g. mining, fishing, pulp and paper production). Use an example to show the challenges and opportunities of meeting a minimum TCE.
- (ii) Briefly compare and contrast each of the following paired terms with reference to protection of natural resources for sustainable development:
  - (4) (a) Ecosystem stability and market demands
  - (4) (b) Environmental regulations and privatization
  - (4) (c) Strategic information and uncertainty

### Problem 5

Provide answers to the following questions related to *ISA 14000/14001 Standards, resource problems and design* with consideration of *ecological, economic and demographic dimensions*:

- (10) (i) Describe three (3) important steps that an expanding gold mine needs to take to achieve its ISO 14000/14001 standards certification assuming that it has already completed the ISO 9000 registration.
- (10) (ii) Explain how the environmental impact assessment (EIA) process may be used in predicting and addressing design, resource, ecological, economic and demographic challenges. Use an example in your explanation.

### Problem 6

Provide answers to the following questions related to *techniques to integrate knowledge and define policy, life cycle analysis and risk management* as it relates to the restructuring of steel manufacturer *Allsteel*. The CEO of *Allsteel* has promised the shareholders that the company will meet its new environmental objectives to reduce its carbon footprint while reducing the life cycle cost per tonne of steel produced. This will make *Allsteel* eligible for major government grants and improve its competitiveness globally. As the plant engineer, you have been asked by the CEO to prepare a technical report to explain how the company will meet its objectives, over the next 5-years, by the application of:

- (6) (i) Knowledge based operational policy change
- (7) (ii) Life cycle analysis
- (7) (iii) Risk management assessment

### Problem 7

Provide answers to the following questions related to *environmental management systems (EMS) and risk analysis* by comparing and contrasting the following terms using an example for each:

- (6) (i) Goals and targets in a management program
- (7) (ii) Measuring and monitoring critical management activities
- (7) (iii) Risk assessment and risk management

## Marking Scheme

1. (i) 7, (ii) 7, (iii) 6 marks, 20 marks total
2. (i) 5, (ii) 4, (iii) 5, (iv) (a) 3, (b) 3 marks, 20 marks total
3. (i) 5, (ii) 7, (iii) 8 marks, 20 marks total
4. (i) 8, (ii) (a) 4, (b) 4, (c) 4 marks, 20 marks total
5. (i) 10, (ii) 10 marks, 20 marks total
6. (i) 6, (ii) 7, (iii) 7 marks, 20 marks total
7. (i) 6, (ii) 7, (iii) 7 marks, 20 marks total